Web Full stack Admission test Sample (J)
Name :

Section One Programming Basics

```java
public class Main {
    public static void main(String[] args) {
        int[] arr = {2, 4, 6, 8, 10};
        int sum = 0;
        for (int i = 0; i < arr.length; i++) {
            sum += arr[i];
        }
        System.out.println(sum / arr.length);
    }
}
```

Answer :

```java
public class Main {
    public static void main(String[] args) {
        int[] arr = {1, 2, 3, 4, 5, 6};
        for (int i = 0; i < arr.length; i++) {
            if (arr[i] % 2 == 0) {
                arr[i] /= 2;
            } else {
                arr[i] *= 2;
            }
        }
        for (int i : arr) {
            System.out.print(i + " ");
        }
    }
}
```

Answer

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```java
public class Main {
    public static int factorial(int n) {
        if (n == 0) return 1;
        return n * factorial(n - 1);
    }

    public static void main(String[] args) {
        System.out.println(factorial(5));
    }
}
```

Answer

```java
public class Main {
    public static int fibonacci(int n) {
        if (n <= 1) return n;
        return fibonacci(n - 1) + fibonacci(n - 2);
    }

    public static void main(String[] args) {
        System.out.println(fibonacci(6));
    }
}
```

Answer

```java
public class Main {
    public static int gcd(int a, int b) {
        if (b == 0) return a;
        return gcd(b, a % b);
    }

    public static void main(String[] args) {
        System.out.println(gcd(48, 18));
    }
}
```

Answer

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Section two OOP

1. **What is the main advantage of using interfaces in object-oriented design?**

   a) They allow multiple inheritance.
   b) They provide a way to achieve runtime polymorphism.
   c) They enforce a contract for what a class can do without dictating how it should do it.
   d) They allow the creation of objects.

2. **What is the primary purpose of a destructor in object-oriented programming?**

   a) To initialize objects.
   b) To free resources that the object may have acquired during its lifetime.
   c) To enforce encapsulation.
   d) To provide multiple ways to create an object.

3. **How does abstraction benefit software development in OOP?**

   a) It increases the complexity of the system.
   b) It provides a way to hide the implementation details and show only the functionality.
   c) It reduces the number of classes needed.
   d) It allows for the implementation of multiple methods.

4. **Which of the following best describes the concept of encapsulation in object-oriented programming?**

   a) Combining data and behavior in a single unit.
   b) Deriving a new class from an existing class.
   c) Ensuring that a class has only one responsibility.
   d) Creating a blueprint for objects.

5. **Which of the following is not a characteristic of an abstract class?**

   a) It can have instance variables.
   b) It can be instantiated directly.
   c) It can have abstract methods.
   d) It can have concrete methods.

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Section Three Database and analysis

The local library wants to implement a computerized system to manage its book lending process. The library has multiple books, and each book can have multiple copies. Members of the library can borrow books, and each member can borrow multiple books. The system should allow members to register, search for books, borrow books, and return books. Additionally, librarians should be able to add new books, update book information, and manage member information.

Your Task:

As a database analyst, you are tasked with designing a database system for the library management system. Based on the scenario described, answer the following questions:

1- List the primary entities that would be part of the database system for the library management system.

2- Draw an Entity-Relationship Diagram (ERD) that represents the entities and relationships identified in question 1. Clearly indicate primary keys and foreign keys.

3- Write SQL queries for the following operations:
   a. Insert a new member into the system.
   b. Add a new book to the library.
   c. Borrow a book for a member.
   d. Retrieve all available copies of a specific book.
   e. Return a borrowed book.

Section Four Web front end

Using the provided screenshot, your task is to replicate the home web page using HTML and CSS. Ensure that the design is responsive and visually matches the screenshot provided.

Requirements

1- Use semantic HTML5 elements where appropriate.
2- Ensure the layout is responsive and adjusts gracefully to different screen sizes.
3- Style the page using CSS to match the visual design of the screenshot.

Note:

It is not required to clone the screenshot exactly, but aim to create something as close as possible to the given design.

Deliverables:

- A complete HTML file with the structure of the web page.
- A CSS file with all the styles applied to replicate the design in the screenshot.